Forward Chaining Example

Consider the following propositional knowledge base (KB):

1. $P \Rightarrow Q$
2. $L \wedge M \Rightarrow P$
3. $B \wedge L \Rightarrow M$
4. $A \wedge P \Rightarrow L$
5. $A \wedge B \Rightarrow L$
6. A
7. B

Proof that $KB \models Q$ using **forward chaining**.

The proof is done as follows:

- The propositions (6) and (7) satisfies the condition of (5) resulting in (8) L when using modus ponens.

8. L

- The propositions (7) and (8) satisfies the condition of (3) resulting in (9) M when using modus ponens.

9. M

- The propositions (8) and (9) satisfies the condition of (2) resulting in (10) P when using modus ponens.

10. P

- The proposition (10) satisfies the condition of (1) resulting in (11) Q when using modus ponens.

11. Q

Since Q is deduced, $KB \models Q$.

The final knowledge base (KB) is:

1. $P \Rightarrow Q$
2. $L \wedge M \Rightarrow P$
3. $B \wedge L \Rightarrow M$
4. $A \wedge P \Rightarrow L$
5. $A \wedge B \Rightarrow L$
6. A
7. B
8. L
9. M
10. P
11. Q

Backward Chaining Example

Consider the following propositional knowledge base (KB):

1. $P \Rightarrow Q$
2. $L \wedge M \Rightarrow P$
3. $B \wedge L \Rightarrow M$
4. $A \wedge P \Rightarrow L$
5. $A \wedge B \Rightarrow L$
6. A
7. B

Proof that KB $\models$ Q using **backward chaining**.

The proof is done as follows:

- To prove KB $\models$ Q, it must be proven that P is true according to (1).
- For P to be true, L and M must be true according to (2).
- For L to be true, A and P must be true according to (4).
- Also, for L to be true, A and B must be true according to (5).
- For M to be true, B and L must be true according to (3).
- We know A and B are true according to (6) and (7).

For the rest of the proof, forward chaining is applied as follows:

- The propositions (6) and (7) satisfies the condition of (5) resulting in (8) L when using modus ponens.

8. L

- The propositions (7) and (8) satisfies the condition of (3) resulting in (9) M when using modus ponens.

9. M

- The propositions (8) and (9) satisfies the condition of (2) resulting in (10) P when using modus ponens.

10. P

- The proposition (10) satisfies the condition of (1) resulting in (11) Q when using modus ponens.

11. Q

Since Q is deduced, KB ⊨ Q.

The final knowledge base (KB) is:

1. P ⇒ Q
2. L ⋀ M ⇒ P
3. B ⋀ L ⇒ M
4. A ⋀ P ⇒ L
5. A ⋀ B ⇒ L
6. A
7. B
8. L
9. M
10. P
11. Q